FOR OFFICIAL USE ONLY

JPRS L/8354

27 March 1979

[redacted]

USSR

[redacted]

EAST EUROPE

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ENGINEERING AND EQUIPMENT

(FOUO 1/79)

U. S. JOINT PUBLICATIONS RESEARCH SERVICE

[redacted]

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000100030057-5

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000100030057-5

BIBLIOGRAPHIC DATA SHEET	1. Report No. JPRS L/8354	2.	3. Recipient's Accession No.
4. Title and Subtitle USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS - ENGINEERING AND EQUIPMENT , (FOUO 1/79)			5. Report Date 27 March 1979 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201			10. Project/Task/Work Unit No. 11. Contract/Grant No.
12. Sponsoring Organization Name and Address			13. Type of Report & Period Covered 14.
15. Supplementary Notes			

16. Abstracts

The report contains abstracts and news items on aeronautical, marine, mechanical, automotive, civil and industrial engineering, related research and development, and engineering materials and equipment.

17. Key Words and Document Analysis. 17a. Descriptors

USSR
Eastern Europe
Aeronautics
Industrial Engineering
Marine Engineering
Stress Analysis
Turbines
Metrology

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group 1A, 13H, 13J, 14B

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
For Official Use Only. Limited Number of Copies Available From JPRS	UNCLASSIFIED	68
	20. Security Class (This Page) UNCLASSIFIED	22. Price

FORM NTIS-35 (10-70)

USCOMM-DC 40329-P71

JPRS L/8354

27 March 1979

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ENGINEERING AND EQUIPMENT

(FOUO 1/79)

This serial publication contains abstracts of articles and news items from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

Photoreproductions of foreign-language sources may be obtained from the Photoduplication Service, Library of Congress, Washington, D. C. 20540. Requests should provide adequate identification both as to the source and the individual article(s) desired.

CONTENTS PAGE

ENGINEERING
Fluid Mechanics

USSR

UDC 536.242

TRANSIENT HEAT TRANSFER FROM A CUTOUT IN A PLANE-PARALIEL PLATE TO A WATER STREAM

Moscow VYSOKOTEMPERATURNYYE OKHLAZHDAYEMYYE GAXOVYYE TURBINY DVIGATELEY LETATEL'NYKH APPARATOV [Cooled High-Temperature Gas Turbines for Aircraft Engines] in Russian, No 2, 1977 pp 27-36

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DIVIGATELI, No 9, Sep 78 Abstract No 9.34.44]

PANTELEYEV, A.A. and TRUSHIN, V.A.

[Text] Results of an experimental study are presented pertaining to transient heat transfer during flow of a water stream through a cutout in a plate. The test data have been processed on the basis of a numerical solution to the reverse heat-conduction problem (correctly formulated) and by implementation of an implicit finite-difference algorithm on a digital computer. For better accuracy of this data processing, the input data were smoothed by means of a spline approximation of the temperature readings with smooth functions. Experiments have demonstrated that numerical processing of test data can produce successful results in a study of transient heat transfer at the turbine blades of gas turbine engines. Figures 6; references 14.

USSR

UDC 621.438-226.1

EFFECT OF A CIRCUMFERENTIALLY NONUNIFORM GAS TEMPERATURE ON THE LOSSES IN TURBINE ARRAYS

Moscow BYSOKOTEMPERATURNYYE OKHLAZHDAYEMYYE GAZOVYYE TURBINY DVIGATELEY LETATEL'NYKH APPARATOV [Cooled High-Temperature Gas Turbines for Aircraft Engines] in Russian, No 2, 1977 pp 73-79

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.43]

GRIGOR, B.P. and STEN'KIN, YE.D.

[Text] Analytical relations are derived for the additional losses due to inefficient streamlining of turbine blades, as a consequence of a circumferentially nonuniform temperature field. These relations for the additional losses are useful for more precisely designing a turbine and profiling the blade arrays. Figures 3; references 4.

USSR

UDC 621.438:536.24

STUDY OF THE HEAT TRANSFER IN POORLY VENTILATED ROTATING ANNULAR CAVITIES OF GAS TURBINE RUNNERS

Moscow VYSOKOTEMPERATURNYYE OKHLAZHDAYEMYYE GAXOVYYE TURBINY DVIGATELEY LETATEL'NYKH APPARATOV [Cooled High-Temperature Gas Turbines for Aircraft Engines] in Russian, No 2, 1977 pp 55-58

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.41]

BODUNOV, M.N. and SALOV, N.N.

[Text] Experimental data are presented pertaining to the mean heat transfer coefficient at the outside cylindrical surface of a rotating annular cavity with circulation of the heat carrier. Water was used as the heat carrier in this study. The heat transfer coefficient was determined by the calorimetric method. The results have been subsequently generalized in accordance with scaling theory. Figures 2; references 4.

USSR

UDC 621.438-253

STUDY OF THE HEAT TRANSFER FROM A GAS TO THE FOIL SURFACE OF A TURBINE BLADE WITH TRANSPIRATION COOLING

Moscow VYSOKOTEMPERATURNYYE OKHLAZHDAYEMYYE GAZOVYYE TURBINY DVIGATELEY LETATEL'NYKH APPARATOV [Cooled High-Temperature Gas Turbines for Aircraft Engines] in Russian, No 2, 1977 pp 46-49

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.40]

DEZIDER'YEV, S.G., ZAMALYUTDINOV, M.M. and KARIMOVA, A.G.

[Text] A procedure is outlined for experimentally determining the correction factors by which readings of the mean-mass flow rate of a collant must be multiplied to yield the local flow rates. As an example, such a correction factor as a function of the pressure on the inlet side of a permeable wall is given for one point on the blade profile. Figures 3; references 3.

USSR UDC 533.27:621.438

COOLING OF GAS-AIR STREAMS BY INJECTION OF A LIQUID

Moscow VYSOKOTEMPERATURNYYE OKHLAZHDAYEMYYE GAZOVYYE TURBINY DVIGATELEY LETATEL'NYKH APPARATOV [Cooled High-Temperature Gas Turbines for Aircraft Engines] in Russian, No 2, 1977 pp 67-73

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETYNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.39]

LIMANSKIY, A.S., SAL'NIKOV, G.M. and SHARAPOV, L.YE.

[Text] A method has been developed for analyzing the various factors which affect the process of liquid evaporation in a gas stream. This method is based on the one-dimensional theory of two-phase flow. An example is shown to illustrate the calculation of the process parameters in the exit channel of a gas turbine plant with injection of a liquid for cooling purposes. Figures 3; references 7.

USSR UDC 532.525:551.32(-194)

FLOW SEPARATION IN OVEREXPANDED SUPERSONIC NOZZLES WITH AN EXTERNAL WIND

Moscow VOPROSY TEORII I RASCHETA RABOCHIKH PROTSESSOV TEPLOVYKH DVIGATELEY

[Problems in Theory and Design of Working Processes for Heat Engines] in Russian, No 1, 1977 pp 120-125

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.129]

PANCHENKO, V.I., TOLSTUKHIN, G.N., VINOGRADOV, B.S. and ANDRONOV, YU.N.

[Text] It has been experimentally demonstrated that the angle through which an oblique density jump deflects a supersonic stream can be made 25° or still larger. The length of the separation zone does not exceed two thicknesses of the boundary layer. Such a deflection can occur when the outer boundary of the supersonic mainstream is formed and governed by another external stream such as a wind. Figures 5; references 2.

USSR UDC 532.525:551.32(-194)

FLOW SEPARATION IN OVEREXPANDED SUPERSONIC NOZZLES WITH AN EXTERNAL WIND

Moscow VOPROSY TEORII I RASCHETA RABOCHIKH PROTSESSOV TEPLOVYKH DVIGATELEY [Problems in Theory and Design of Working Processes for Heat Engines] in Russian, No 1, 1977 pp 120-125

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.129]

PANCHENKO, V.I., TOLSTUKHIN, G.N., VINOGRADOV, B.S. and ANDRONOV, YU.N.

[Text] It has been experimentally demonstrated that the angle through which an oblique density jump deflects a supersonic stream can be made 25° or still larger. The length of the separation zone does not exceed two thicknesses of the boundary layer. Such a deflection can occur when the outer boundary of the supersonic mainstream is formed and governed by another external stream such as a wind. Figures 5; references 2.

USSR UDC 532.517:681.121.842

INFLUENCE THAT THE VELOCITY PROFILE OF THE ONCOMING FLOW HAS ON THE COEFFICIENT OF DISCHARGE OF CONSTRICTING DEVICES

*TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNYY NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT FIZIKOTEKHNICHESKIKH I RADIOTEKHNICHESKIKH IZMERENIY [Proceedings of Metrological Institutes of the USSR. All-Union Scientific Research Institure of Physicotechnical and Radiotechnical Measurements] in Russian No 182/242, 1978 pp 74-78

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA, No 9, 1978, Abstract No 9.32.754]

GARSHIN, P. A., SMIRNOV, R. YE. and TUPICHENKOV, A.A.

[Text] A universal equation is suggested, relating the velocity profile of the oncoming flow to the coefficient of discharge of constricting devices. Graphs are presented of the function $\alpha = f(K_s)$ for diaphragms and normal nozzles with angular pressure extraction. An experimental check of this equation shows it is quite suitable for practical calculations. Figure 1, Table 1, References 7.

USSR UDC 532.593

SOME RESULTS OF ANALYSIS OF SHORT-PERIOD INTERNAL WAVES

MORSKIYE GIDROFIZICHESKIYE ISSLEDOVANIYA [Marine Hydrophysical Research] in Russian No 4, 1977 pp 250-261

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B39 (résumé)] BUKATOV, A. YE., PARAMONOV, A.N., SMIRNOV, G.V. and CHERKESOV, L.V.

[Text] Based on the materials of observations in different regions of the world's oceans, a theoretical analysis is made of a possible mechanism of generation of short-period internal waves. References 17.

USSR UDC 532.593

CONCERNING SOME PARTICULARS OF THE SPECTRA OF SHORT-PERIOD INTERNAL WAVES AND THE VERTICAL FINE STRUCTURE OF THE OCEAN

MORSKIYE GIDROFIZICHESKIYE ISSLEDOVANIYA [Marine Geophysical Research] in Russian No 4, 1977 pp 117-131

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B40 (résumé)] PANTELEYEV, N. A.

[Text] On the basis of experimental data, an investigation is made of the spectra of short-period internal waves and vertical fine structure. These spectra were taken by autonomous measuring equipment and a falling probe. The measurement results enable evaluation of the quantitative relation between the space and time scales of motions associated with internal waves and small-scale turbulence. Some peculiarities in the spectra of internal waves in the region of the local Brent-Wiajsial frequency are explained by existing theoretical models. References 20.

USSR UDC 532.516

INFLUENCE THAT RADIAL BLOW-IN HAS ON THE DRAG OF A SPHERE IN A FLOW AT LOW REYNOLDS NUMBERS

Dnepropetrovsk PRIKLADNYYE VOPROSY TEPLOMASSOOBMENA [Applied Problems of Heat and Mass Exchange] in Russian 1977 pp 51-54

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B62 by the authors]

LYCHAGIN, N. N. and KHARITONOV, A. A.

[Text] An examination is made of the problem of incompressible viscous fluid flow around a permeable sphere at low Reynoles numbers. The velocity distribution of the injected fluid is given in such a way that the maximum value of injection velocity is reached on the upstream side of the sphere. It is assumed that the maximum blow-in velocity is of the same order as the velocity of the oncoming flow, and that the physical properties of the injected fluid and the oncoming flow are the same. The problem was solved by the method of splicing asymptotic solutions. The distribution of velocities and pressure is found in the vicinity of the sphere in the second approximation. It is shown that nonuniformity of radial blow-in increases the drag of the sphere. Figures 5.

USSR UDC 532.516

VISCOUS FLUID FLOW AROUND AN ELLIPTICAL CYLINDER

Moscow ZHURNAL VYCHISLITEL'NOY MATEMATIKI I MATEMATICHESKOY FIZIKI in Russian Vol 18, No 2, 1978 pp 445-457

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B63 by the author]

MELLER, N. A.

[Text] The problem of viscous fluid flow around an elliptical cylinder at an angle of attack is numerically solved. In elliptical coordinates the computational region is broken up into subregions, and in each of these the boundary value problem is solved by a matrix sweep method. Before solution of the problem, computational schemes are numerically studied to select the

grid spacing. Examples are given of calculation for an ellipse with relative thickness of 0.1 at an angle of attack of 30° and Reynolds numbers of 20 and 40.

USSR UDC 532.516

CONCERNING GYROSCOPIC SPIN OF THE BALLS IN A HIGH-SPEED BEARING UNDER HYDRODYNAMIC FRICTION CONDITIONS

Kuybyshev MATERIALY DOKLADOV VTORY VSESOYUZNOY KONFERENTSII PO KONTAKTNO-GIDRODINAMICHESKOY TEORII SMAZKI I YEYE PRAKTICHESKOMU PRIMENENIYU V PROMYSHENNOSTI [Materials of Reports to the Second All-Union Conference on Contact-Hydrodynamic Lubrication Theory and its Practical Application in Industry] in Russian No 1, 1977 pp 74-85

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B110 by the authors]

KURUSHIN, V. I. and PETROV, V. M.

[Text] The paper presents a system of nonlinear equations for determining the kinematic parameters of motion of balls under hydrodynamic conditions of friction in the contacts. A numerical solution is used to establish the working conditions under which intense slippage of balls takes place in the radial plane due to the action of gyroscopit torque.

USSR

UDC 532.517.4

TURBULENCE CHARACTERISTICS OF COAXIAL JETS

NAUCHNYYE TRUDY. MOSKOVSKIY INSTITUT STALI I SPLAVOV [Scientific Transactions. Moscow Institure of Steel and Alloys] in Russian No 107, 1978 pp 26-31

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B140 by the author]

MESHALIN, V. S.

[Text] An investigation is made of the turbulence characteristics of coaxial jets with different initial discharge conditions. It is shown how a change in the ratio of velocities of the central and surrounding streams and also the thickness of the annular stream influence the distribution of turbulence characteristics along the axis and in the cross sections of a coaxial jet.

USSR

UDC 532.517.4

TURBULENCE CHARACTERISTICS OF A JET AT AN ANGLE OF ATTACK TO A FLAT WALL

NAUCHNYYE TRUDY. MOSKOVSKIY INSTITUT STALI I SPLAVOV [Scientific Transactions. Moscow Institure of Steel and Alloys] in Russian No 107 pp 36-39

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B141 by the author]

MESHALIN, V. S.

[Text] The paper gives the results of an experimental study of the turbulence characteristics of a jet at different angles of attack against a flat surface. It is shown that with an increase in the angle of attack there is an increase in the turbulence level along the axis of the jet, while the maximum level of turbulence along the axis shifts toward the nozzle tip. In transverse cross sections of a jet in the horizontal plane, the level of turbulence with respect to width of the jet approximately triples, and in the vertical plane it doubles as compared with the value along the axis.

USSR UDC 533.6.011

PARTICULARS OF THE SHAPE AND DEPARTURE OF A COMPRESSION SHOCK WITH VIBRATION OF AN AIRFOIL

UCHENYYE ZAPISKI TESENTRAL'NOGO AERO-GIDRODINAMICHESKOGO INSTITUTA [Scientific Annals of the Central Aerohydrodynamics Institure] in Russian Vol 8, No 5, 1977 pp 105-109

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B218 by N. M. Kuznetsov]

VINOGRADOV, R. I., MAR'YANOV, V. M. and YAKUBOV, I. R.

[Text] The paper gives the results of a systematic experimental study of flow around diamond-shaped and some other airfoils that undergo torsional vibrations in a supersonic airflow. The following were varied: Mach number from 1.3 to 2 in steps of 0.1; dimensionless vibration frequency from 0.1 to 1.2 in steps of 0.05-0.1; angle of the diamond 10, 20, 30 and 40°; angular amplitude of torsional vibrations 2, 6, 10 and 15°; and position of the axis of torsional vibrations. Still photographs and numerous motion pictures show the evolution of compression shocks propagating in different directions. Patterns of development and orientation of shocks are discussed. References 5.

USSR UDC 533.6.011.8

ON THE AYMPTOTIC THEORY OF HYPERSONIC FLOWS WITH NONEQUILIBRIUM IONIZATION IN THE VICINITY OF A CRITICAL POINT

UCHENYYE ZAPISKI TSENTRAL'NOGO AERO-GIDRODINAMICHESKOGO INSTITUTA [Scientific Annals of the Central Aerohydrodynamics Institure] in Russian Vol 9, No 1, 1978 pp 45-56

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B321 (résumé)]

AGAFONOV, V. P., KUZNETSOV, M. M. and POLYANSKIY, O. YU.

[Text] Based on the asymptotic theory of nonequilibrium gas flows with high local Reynolds numbers an analysis is made of the problem of determining the concentration of gas components (including electrons) in the field

of flow around blunt bodies at hypersonic velocities. A new parameter is introduced -- the ratio of the characteristic gas-dynamic time to the time of relaxation, whose value characterizes the thermodynamic state of the gas and the concentration of components on the outer face of the boundary layer in the vicinity of a critical point. It is shown that when $\Delta^* \gg$ Prandtl's boundary layer theory is valid with equilibrium values of concentrations on the outer face. The cases $\Delta^* \sim 1$ and $\Delta^* \ll 1$ correspond to the nonequilibrium state of flow along the entire length of the critical stream line from the compression shock to the body. References 16.

USSR

UDC 536.24

CONCERNING THE MUTUAL INFLUENCE OF THERMOCHEMICAL DESTRUCTION OF THE SURFACE AND VISCOUS INTERACTION WITH HYPERSONIC FLOW AROUND A SHARP CONE

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMYSTVENNYY SBORNIK [Space Research in the Ukranie. Republic Interdepartmental Collection] in Russian No 11, 1977 pp 23-26

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B571 by the authors]

LIMANSKIY, A. V. and TIMOSHENKO, V. I.

[Text] The paper gives the results of numerical calculation for hypersonic gas flow under conditions of viscous interaction around sharp circular cones with thermally destructible Teflon surface. The authors show the characteristic pecularities of the mutual influence of thermochemical destruction of the surface of the body and viscous interaction. References 15.

USSR UDC 532.5:621.22

DETERMINATION OF FLOWS OF GENERATED VIBRATIONAL ENERGY IN DEVELOPED CAVITATIONAL SELF-OSCILLATIONS

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Space Research in the Ukraine. Republic Interdepartmental Collection] in Russian No 11, 1977 pp 50-54

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B1222 by the author]

PILIPENKO, V. V.

[Text] It is experimentally established that a centrifugal screw pump generates fluxes of vibrational energy in the feeding and pressurized lines. It is shown that the energy flow in the pressure line is caused by variation of the pump head. This shows the possibility of self-excitation of cavitational oscillations in the system even in the absence of oscillations of pressure and flowrate at the pump inlet. This kind of cavitational oscillations is experimentally detected.

USSR UDC 532.5:621.22

THEORETICAL DETERMINATION OF THE PARAMETERS OF THE LIMITING CYCLE OF CAVITATIONAL SELF-OSCILLATIONS IN THE SYSTEM MADE UP OF A CENTRIFUGAL SCREW PUMP AND PIPELINES WITH CONSIDERATION OF UNSTEADY FLOW AROUND THE BLADES OF AN AXIAL SCREW FOREPUMP UNDER CONDITIONS OF PARTIAL CAVITATION (WITHOUT BACKFLOWS)

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Space Reeearch in the Ukraine. Republic Interdepartmental Collection] in Russian No 11, 1977 pp 41-47

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B1227 by the authors]

PILIPENKO, V. V. and DOVGOT'KO, N. I.

[Text] A method is proposed for theoretical determination of the parameters of the limiting cycle of cavitational self-oscillations. The authors establish the influence that regime parameters of the system (pressure at

the pump inlet and flowrate through the pump) have on the frequency, amplitude and waveshape of cavitational self-oscillations. Satisfactory agreement is observed between theoretical and experimental results. References 8.

USSR UDC 533.69.011

ON THE LOWER LIMIT IF INDUCTIVE-WAVE DRAG FOR SWEPTBACK WINGS

Novosibirsk ISSLEDOVANIYA PO AERODINAMIKE NEPLOSKIKH KRYL'YEV [Research on the Aerodynamics of Nonplanar Wings] in Russian, 1977 pp 31-42

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B1269 by V. I. PUTYATA]

KOROBEYNIKOV, N. P.

[Text] An examination is made of supersonic flow around sweptback wings with close to a delta planform or a shape like a swallowtail with cut off edges; it is assumed that the leading edge is subsonic and that the trailing edge is supersonic. Within the framework of a linear theory, the author determines the limiting minimum values of that part of the drag of such wings that depend on lift. Such estimates may play an important part as a criterion of effectiveness of optimization of the shape of the middle surface of the wing, enabling a reduction in eddy and wave drag for a given lift of the wing due to the possibility of realization of suction forces. Some examples are given that characterize both the role of the suction forces and the presence of additional resources for a further reduction of drag through deformation of the middle surface.

USSR

UDC 533.69.011

DISTRIBUTED AERODYNAMIC CHARACTERISTICS OF SWEPTBACK WINGS WITH OPTIMUM SIX-PARAMETER DEFORMATION OF THE MIDDLE SURFACE

Novosibirsk ISSLEDOVANIYA PO AERODINAMIKE NEPLOSKIKH KRYL'YEV [Research on the Aerodynamics of Nonplanar Wings] in Russian, 1977 pp 6 13

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B1270 by V. I. Putyata]

BELOLIPETSKAYA, G. T. and KOROBEYNIKOV, N. P.

[Text] To elucidate the mechanism that enables a reduction in the lift-dependent drag of a wing at supersonic velocities through deformation of the middle surface of the wing, the authors use a linear theory in a detailed analysis of the distributed aerodynamic characteristics of delta and near-delta wings with the equation of the middle surface given in the form of a power-law polynomial that depends on six parameters with values determined from solution of the problem for an arbitrary minimum drag. It is established that a reduction in drag occurs chiefly due to the wing close to the leading edge where suction forces are realized that are in fact the main sources of drag.

USSR

UDC 533.652/.661.013

DETERMINING THE COEFFICIENTS OF DAMPING $\left(m_z^{\omega_z} + m_z^{\dot{\alpha}}\right)$ BY THE METHOD OF FREE OSCILLATIONS USING HIGH-SPEED MOTION PICTURE PHOTOGRAPHY

TEMATICHESKIY SBORNIK NAUCHNYKH TRUDOV. MOSKOVSKIY AVIATSIONNYY INSTITUT [Topical Collection of Scientific Papers. Moscow Aviation Institute] in Russian No 417, 1977 pp 29-35

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B1286 by G. S. Aronin]

BABONIN, V. V. and KOLMAKOV, YU. A.

[Text] The paper describes an experimental facility for determining the overall coefficient of the longitudinal moment of damping of a model in a wind tunnel. In the installation the model is fastened on the moment axis by two precision ball bearings in which a brace is provided to reduce friction by taking the weight of the model. Free oscillations of the model in the stream in the tunnel are photographed by a high-speed motion picture camera equipped with a time indicator. The formula that is given for determining the damping coefficient from data of interpretation of the motion picture film does not take account of the influence of friction in the ball bearings, which is taken as negligible.

USSR UDC 533.652/.661.013

NONLINEAR OSCILLATIONS OF AN ASYMMETRIC FLIGHTCRAFT

KOSMICHESKIY ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Space Research in the Ukraine. Republic Interdepartmental Collection] in Russian No 11, 1977 pp 3-7

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B1291 by the authors]

MOROZ, A. P. and PENYA, V. N.

[Text] An examination is made of the problem of oscillations of a rotating asy-metric flightcraft with consideration of the nonlinear dependence of aerodynamic characteristics on angles of attack and sliding, as well as the variability of the parameters of motion of the center of mass. First-approximation differential equations are derived for determining the amplitude and phase of the space angle of attack of an asymmetric flightcraft.

An investigation is made of the influence that nonlinearity of the aerodynamic characteristics of a flightcraft has on the amplitude of the space angle of attack in the parametric resonance zone. References 5.

USSR UDC 621.4/.6:533.6

ON DETERMINING THE OPTIMUM ANGLE OF EXIT OF THE GAS FROM A BLADELESS NOZZLE ASSEMBLY OF AN AXIAL TURBINE

GIDRODINAMIKA LOPATOCHNYKH MASHIN I OBSHCHAYA MEKHANIKA [Hydrodynamics of Vane Machines and General Mechanics] in Russian 1977 pp 78-83

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B1383 by the authors]

GOLUBTSOV, V. M. and SAPOZHNIKOV, N. I.

[Text] Based on experimental studies of the parameters of bladeless nozzle assemblies of axial turbines, a relation is found for the change in the velocity loss factor at different angles of flow exit. A method is given for choosing the angle of exit from the condition of achieving maximum turbine efficiency.

USSR

UDC 533.6.013.42

AN APPROXIMATE METHOD OF STUDYING THE PROBLEM OF NONLINEAR OSCILLATIONS OF A LIQUID IN A CAVITY WITH AN ANNULAR UNDISTURBED FREE SURFACE

Kiev DINAMIKA I USTOYCHIVOST' UPRAVLYAYEMYKH SISTEM [Dynamics and Stability of Controllable Systems] in Russian, 1977 pp 104-116

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V362 (from the article)]

PIL'KEVICH, A. M.

[Text] An examination is made of the problem of nonlinear oscillations of an ideal incompressible liquid in a cavity with annular undisturbed free surface. The algorithm used for solving the problem (see I. A. Lukovskiy, "Nelineynyye kolebaniya zhidkosti v sosudakh slozhnoy geometricheskoy formy" [Nonlinear Oscillations of Liquid in Vessels of Complex Geometric Shape], Kiev, "Naukova dumka," 1975) reduces the initial nonlinear problem to a series of linear boundary value problems that are solved by a variational method. The results are numerically analyzed for some specific cases.

USSR

UDC 533.6.013.42

INVESTIGATION OF NONLINEAR OSCILLATIONS OF A LIQUID IN MOVING CAVITIES OF REVOLUTION WITH UNBROKEN RADIAL PARTITIONS

Kiev DINAMIKA I USTOYCHIVOST' UPRAVLYAYEMYKH SISTEM [Dynamics and Stability of Controllable Systems] in Russian, 1977 pp 117-130

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V363 (from the article)]

STAROSILA, N. I.

[Text] An investigation is made of small oscillations of an ideal incompressible liquid sloshing in a cavity of revolution with unbroken radial partitions. It is assumed that the cavity undergoes predetermined translational movements. A series of boundary value problems is derived for the components of the velocity potential as well as nonlinear equations of motion of the liquid and expressions for the coefficients of these equations.

USSR UDC 533.6.013.42

VARIATIONAL FORMULATIONS OF THE PROBLEM OF SMALL OSCILLATIONS OF A LIQUID IN A VESSEL UNDER CONDITIONS CLOSE TO WEIGHTLESSNESS

Kiev DINAMIKA I USTOYCHIVOST' UPRAVLYAYEMYKH SISTEM [Dynamics and Stability of Controllable Systems] in Russian, 1977 pp 74-83

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V364 (from the article)]

BARNYAK, M. YA.

[Text] A variational formulation is given for the problem of small (natural) oscillations of an ideal incompressible liquid in a vessel with consideration of forces of gravitation and surface tension. The constructed numerical algorithms generalize the previously known algorithms for solving the formulated problem. Estimates are found for the eigenvalues of the problem.

High-Energy Devices, Optics and Photography

USSR

UDC 533.9

ON THE FEASIBILITY OF DEVELOPING HIGH-INTENSITY SOURCES OF ULTRAVIOLET RADIATION BASED ON CUMULATIVE PLASMA-DYNAMIC DISCHARGES

PIS'MA V ZHURNAL TEKHNICHESKOY FIZIKI in Russian Vol 3, No 24, 1977 pp 1331-1334

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B423 by O. P. Shatalov]

KAMRUKOV, A. S., KASHNIKOV, G. N., KOZLOV, N. P., ORLOV, V. K. and PROTASOV, YU. S.

[Text] An experimental study is done on the possibility of developing high-intensity plasma-dynamic sources of emission that are based on impact interaction and cumulation of opposed hypersonic dense plasma flows formed by magnetoplasma compressors. A technique is described for creating the plasma flows, and the parameters of the compressors are given as well as the nature of formation of the cumulative zone bounded by shock waves on two sides. The brightness temperature of the plasma in the cumulation zone was 25 000-35 000 K at a rate of temperature rise of about 10^{10} deg/s. An investigation is made of the spectral makeup of the radiation, the integral light yield and the dependence of these characteristics on the discharge time. It is shown that the efficiency of stimulated emission in the visible and ultraviolet regions of the spectrum with collision of plasma jets increases considerably as compared with the radiation when the plasma is decelerated at a wall.

USSR

UDC 533.9

RADIATION ABSORPTION IN A PLASMA FORMED CLOSE TO THE SURFACE OF A SOLID TARGET AT HIGH AMBIENT GAS PRESSURES

FIZIKA PLAZMY in Russian Vol 4, No 2, 1978 pp 332-337

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B408 by the authors]

RYKALIN, N. N., UGLOV, A. A. and GALIYEV, A. L.

[Text] An investigation is made of the kinetic characteristics of a laser plasma that is formed by the action of pulse radiation (λ = 1.06 μm) on the

surface of a stainless steel target in an atmosphere of nitrogen, helium and argon in the pressure range of 10-80 atmospheres. Curves are plotted that characterize transmission of laser emission by the plasma as a function of pressure, time and the specific power of the emission. An estimate is made of the average temperature of the plasma cloud and the velocity of the products of vaporization under conditions of back pressure. References 12.

USSR

UDC 533.9

GASDYNAMIC AND MOLECULAR PROCESSES IN CIRCULATING GAS LASERS

Minsk PROBLEMY TEPLO- I MASSOOBMENA 77 [Problems of Heat and Mass Exchange 77] in Russian, 1977 pp 85-87

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B429 by O. P. Shatalov]

KARNYUSHIN, V. N. and SOLOUKHIN, R. I.

[Text] A brief survey is presented on problems associated with impulse heating of gas in the zone of stimulated emission, and with the influence that the nature of flow has on the formation and stability of the discharge in a continuous-flow CO_2 gas-discharge laser. In particular the authors take note of the influence that the shock waves formed in the pulse discharge zone and moving through the gas have on the rate of renewal of the gas in the discharge gap; consideration is given to distortion of homogeneity of the laser medium in the discharge zone and the concomitant problems of the dynamics of pumping and stimulated emission; it is emphasized that it is important to study the phenomena in the vicinity of the electrodes in the laser and methods of acting on these phenomena to improve laser characteristics. References 10.

USSR

UDC 533.9

NUMERICAL ANALYSIS OF THE CHARACTERISTICS OF A GASDYNAMIC LASER WITH SELECTIVE THERMAL EXCITATION AND MIXING IN A SUPERSONIC FLOW

Minsk PROBLEMY TEPLO- I MASSOOBMENA 77 [Problems of Heat and Mass Exchange 77] in Russian 1977 pp 89-90

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B430 by O. P. Shatalov]

ACHASOV, O. V., SOLOUKHIN, R. I. and FOMIN, N. A.

[Text] A numerical analysis is done on the characteristics of a gasdynamic CO_2 laser on mixing. The model used assumed instantaneous mixing of hot nitrogen escaping from a nozzle and an injected cold misture of CO_2 + He. The distributions found for the gain of a weak signal in the flow indicate strong dependence of the optimum makeup of the injected gas on temperature; this result finds confirmation in earlier experiments by the authors. Calculated values of energy output of the laser as a function of the nitrogen stagnation temperature show an appreciable increase of energy output (up to 200 J/g) with an increase in nitrogen temperature to 3000 K. References 5.

Industrial Technology

USSR UDC 531.8

KINEMATIC CHARACTERISTICS AND CRITERIA IN SYNTHESIS OF MANIPULATOR AND ROBOT MECHANISMS

SBORNIK NAUCHNO-METODICHESKIKH STATEY PO TEORII MEKHANIZMOV I MASHIN. MINISTERSTVO VYSSHEGO I SREDNEGO SPETSIAL'NOGO OBRAZOVANIYA SSSR [Collection of Articles on Scientific Methods in the Theory of Mechanisms and Machines. Ministry of Higher and Intermediate Special Education of the USSR] in Russian No 6, 1978 pp 20-29

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A193 by the author]

VOROB'YEV, YE. I.

[Text] The paper gives a systematic exposition of the problem of velocities and accelerations of manipulators, and also presents a geometric interpretation of these parameters. Criteria are introduced for transfer of velocities at points in the working zone of the manipulator as well as criteria of kinematic accuracy. It is shown that these critteria can be used as a criterion functional in synthesizing manipulators.

USSR UDC 531.8

EQUATIONS OF THE DYNAMICS OF TRANSFER AND ORIENTATIONAL MOTIONS OF INDUSTRIAL ROBOTS

SBORNIK NAUCHNO-METODICHESKIKH STATEY PO TEORII MEKHANIZMOV I MASHIN. MINISTERSTVO VYSSHEGO I SREDNEGO SPETSIAL'NOGO OBRAZOVANIYA SSSR [Collection of Articles on Scientific Methods in the Theory of Mechanisms and Machines.

Ministry of Higher and Intermediate Special Education of the USSR] in Russian No 6, 1978 pp 30-34

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A268 by the author]

VOROB'YEV, YE. I.

[Text] Expanded equations are given for the dynamics of actuating mechanisms of robots in the case of combinations of two, three and four movements, and also with consideration of the bending elasticity of an "arm."

Mechanics of Solids

USSR UDC 539.3

CALCULATION OF CORRUGATED MULTIPLE-LAYER CIRCULAR CYLINDRICAL SHELLS

GIDRODINAMIKA LOPATOCHNYKH MASHIN I OBSHCHAYA MEKHANIKA [Hydrodynamics of Vane Machines and General Mechanics] in Russian, 1977 pp 140-146

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V125 by the authors]

BOCHAROV, N. I., KONATKIN, V. P. and KATKOV, V. P.

[Text] Strength calculations are given for corrugated multiple-layer cylindrical shells based on experimental determination of their stiffness characteristics for bending, twisting and stretching.

USSR UDC 539.3

EXPERIMENTAL STUDY OF THE STRESSED AND STRAINED STATE OF SHORT CYLINDRICAL SHELLS UNDER THE ACTION OF A RADIAL LOAD

ISSLEDOVANIYA PROSTRANSTVENNYKH KONSTRUKTSIY [Studies of Three-Dimensional Structures] in Russian No 1, 1977 pp 111-118

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V157 by the author]

LEBEDEV, L. N.

[Text] An investigation is made of the stressed and strained state of thin short cylindrical shells reinforced at the ends by circular prismatic bulkheads for the action of a radial load distributed over a small area. Some experimental results are given for shells reinforced by bulkheads of different stiffnesses. References 7.

USSR UDC 539.3

ON THE THEORY OF BENDING AND OSCILLATIONS OF ELASTIC MULTILAYERED ANISOTROPIC PLATES

PRIKLADNYYE PROBLEMY PROCHNOSTI I PLASTICHNOSTI [Applied Problems of Strength and Ductility] in Russian Vol 7, 1977 pp 29-34

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V169 by the authors]

ANDREYEV, A. N. and NEMIROVSKIY, YU. V.

[Text] The paper describes a version of the theory of multilayer plates that is based on a knematic hypothesis satisfying Hooke law in all layers for transverse shears, boundary conditions for tangential stresses on the faces and conditions of continuity of displacements and transverse tangential stresses on all contact surfaces. As an illustration of use of the resultant equations an examination is made of the problem of axisymmetric bending of a circular sandwich plate of symmetric structure. An estimate is made of the influence that shear has on "integral" characteristics--bending, radial and peripheral torques--and on the local characteristics of the stressed state. It is shown that the influence of shearing is insignificant for the former, but considerable for the latter, especially in zones of edge perturbations.

NONLINEAR PROBLEMS IN THE DYNAMICS OF THIN-WALLED THREE-DIMENSIONAL STRUCTURES UNDER PULSE EFFECTS

Tallin NELINEYNYYE VOLNY DEFORMATSII [Nonlinear Strain Waves] in Russian Vol 2, 1977 pp 17-20

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V223 by A. V. Khromushkin]

BASHENOV, V. G., SOLUYANOV, I. I. and SHINKARENKO, A. P.

[Text] A brief description is given of the use of a variational difference method for solving problems in dynamic loading of thin-walled structural elements consisting of joined plates and shells. The problem is considered within the framework of the quadratic approximation of nonlinear elasticity theory with consideration of plastic deformation of material. The system of equations of motion of the structure is defined by a variational

d'Alembert-Lagrange equation and is a system of ordinary nonlinear differential equations of second order with respect to time for displacements of each point of intersection of the grid for partition of the structure. This system is integrated by an explicit scheme of the net-point method. A numerical example is given of solution of the problem of dynamic behavior of a clamped hemispherical shell under the action of initial velocity.

USSR

UDC 539.3:534.1

INFLUENCE THAT INERTIA AND STIFFNESS OF A CONTOUR RING HAVE ON THE FREQUENCIES OF AXISYMMETRIC OSCILLATIONS OF A PLATE

MEKHANIKA STERZHNEVYKH SISTEM I SPLOSHNYKH SRED [Mechanics of Rod Systems and Continuous Media] in Russian No 10, 1977 pp 59-63

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V241 by the authors]

BODUNOV, A. K. and BODUNOV, N. A.

[Text] An examination is made of natural axisymmetric oscillations of a circular plate on an elastic base. Consideration is taken of the inertia and stiffness of an elastic ring reinforcing the freely supported or free edge of the plate. Reference 7.

USSR UDC 624.07:534.1

CALCULATION OF VIBRATIONS OF THREE-DIMENSIONAL PIPELINES WITH ELASTICALLY DAMPED CONSTRAINTS IN THE CASE OF KINEMATIC EXCITATION

Kuybyshev VOPROSY PROYEKTIROVANIYA I COVODKI AVIATSIONNYKH GAZOTURBINNYKH DVIGATELEY [Problems of Design and Alighment of Gas Turbine Aircraft Engines] in Russian 1977 pp 80-106

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V272 by the authors]

KONDRASHOV, N. S. and LASHKOVA, L. A.

[Text] A numerical method is presented for calculating forced oscillations of a pipeline with kinematic excitation by harmonic and random vibration. The algorithm is based on the matrix method of dynamic stiffnesses. Two versions of the algorithm are developed: for a pipeline of arbitrary configuration and for a pipeline with an axis made up of straight sections and arcs of circles. Both versions provide for consideration of elastically damped constraints, the presence of lumped masses and compliant connections. An examination is also made of complex systems comprising several interconnected pipelines or a single pipeline with interconnected points. The paper gives the results of calculation by the proposed method for a three-dimensional pipeline consisting of straight-line segments. References 7.

USSR UDC 539.3:534.1

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF THE STABILITY OF TOROIDAL SHELLS UNDER EXTERNAL PRESSURE

Kazan' IZVESTIYA VUZov: AVIATSIONNAYA TEKNIKA in Russian No 4, 1977 pp 98-102

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V302 by V. I. Kruglyakova]

FEDOSOV, YU. A.

[Text] A solution is found for the axisymmetric problem of loss of stability of a complete torus under the action of external pressure with consideration of the condition of inextensability of an arc of the meridional section. The paper also gives the results of experimental studies on eight models.

USSR

UDC 539.3:534.1

CHANGE IN THE STABILITY OF A CYLINDRICAL SHELL UNDER HYDROSTATIC PRESSURE WHEN SUBJECTED TO TRANSVERSE OSCILLATIONS

MEKHANIKA STERZHNEVYKH SISTEM I SPLOSHNYKH SRED [Mechanics of Rod Systems and Continuous Media] in Russian No 10, 1977 pp 71-76

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V343 by the author]

BIRMAN, V. M.

[Text] An examination is made of axisymmetric oscillations of a smooth cylindrical shell freely supported at the ends under the action of hydrostatic pressure. Oscillations are excited by periodic pressure applied on the lateral surface.

It is shown that variable chain forces that arise with oscillations due to closure of the shell change the stability as compared with the static problem. Oscillations are unstable at a hydrostatic pressure that exceeds the critical value for some relations between the parameters of the load and system, and is less than the critical value for other relations between parameters.

USSR

UDC 539.214;539.374

ADAPTABILITY OF SPHERICAL SHELLS UNDER CYCLIC EFFECTS OF INTERNAL PRESSURE AND NONUNIFORM HEATING

RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Republic Interdepartmental Collection] in Russian No 18, 1978 pp 29 34

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7V465 by the author]

CHERNYAVSKIY, O. F.

[Text] Upper and lower estimates are found for the conditions of onset of a progressive change in shape of spherical axisymmetric shells of constant thickness clamped and hinged around the edge in the case of repeated actions of internal pressure and temperature varying linearly with respect to the thickness of the shell. References 5.

Metrology

USSR UDC 531.788.089.6

A COMBINATION METHOD OF CALIBRATION OF MANOMETERS IN THE AREA OF HIGH AND SUPERHIGH VACUUM

*TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNYY NAUCHNO-ISSLEDOVATEL'-SKIY INSTITUT METROLOGICHESKOY SLUZHBY [Proceedings of Metrological Institutes of the USSR. All-Union Scientific Research Institute of the Metrological Service] in Russian No 223/283, 1978 pp 49-59

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.674]

KUZ'MIN, V. V.

[Text] A combined method is presented for calibration of vacuum meters, representing a combination of two methods: the method of static expansion (expansion method) or the method of calculation of the initial pressure in terms of time (chronometric method), with the method of reduction of this pressure to the region of high and superhigh vacuum. Figures 3, Table 1, References 13.

USSR UDC 535.338.334:621.375.826

DEVELOPMENT OF METHODS OF LASER-DOPPLER MEASUREMENT OF VELOCITIES WITH DIRECT SPECTRAL ANALYSIS

Minsk METODY LAZERNOY DIAGNOSTIKI ODNOFAZNYKH I MNOGOFAZNYKH TECHENIY [Methods of Laser Diagnosis of Single and Multiple-Phase Currents] in Russian 1978, pp 3-73

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.532]

PAPYRIN, A. N. and SOLOUKHIN, R. I.

[Text] The physical principles and specifics of practical realization of laser-Doppler velocity meters (LDVM's) with direct spectral analysis are presented. The devices are based on the use of methods of high resolution interference spectroscopy. A review is presented of the current status of research in this area, and several types of multiple-beam interferometers are described which are of interest for practical LDVM circuits. The

principles of design of scanning and tracking LDVM circuits are analyzed, as well as the specifics of their application in aerodynamic and gas-dynamic experiments. A number of meters with high operating speeds, based on optoelectronic systems, are suggested. Figures 35, References 68.

Navigation and Guidance Systems

USSR

UDC 531

VIBRATIONAL-ROTATIONAL MOTION OF AN ASYMMETRIC SOLID IN A PLANETARY ATMOSPHERE

Kiev CINAMIKA I UPRAVLENIYA DVIZHENIYEM [Dynamics and Motion Control] in Russian, 1978 pp 33-43

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A44 by the authors]

MOROZ, A. P. and PENYA, V. N.

[Text] An examination is made of vibrational-rotational motion of a solid in a planetary atmosphere. Averaged systems of equations are derived that describe the motion of an asymmetric solid in the resonant and nonresonant cases at small angles of attack. It is shown that results found by integrating unaveraged and averaged systems of equations coincide, and it is pointed out that there is an appreciable gain in machine time when averaged equations are integrated as compared with unaveraged. References 8.

USSR

UDC 531

ON INVESTIGATING THE MOTION OF AN ASYMMETRIC SOLID AT ARBITRARY ANGLES OF NUTATION BY USING AN AVERAGING METHOD

Kiev DINAMIKA I UPRAVLENIYE DVIZHENIYEM [Dynamics and Motion Control] in Russian, 1978 pp 43-48

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A45 by the authors]

GOL'DSHTEYN, YU. M. and PENYA, V. N.

[Text] Without limitation on the angle of nutation, the amplitude of oscillations with respect to angle of nutation or angular velocities, a system of differential equations of motion is derived for an asymmetric body that is close to axisymmetric, enabling elimination of rapidly oscillating variables by means of asymptotic methods of separation of motions. An algorithm is developed for eliminating fast variables that is based on V. M. Volosov's method of averaging. References 6.

USSR

UDC 531

INFLUENCE THAT THE FRICTION TORQUE OF A GEARBOX IN AN ACTUATING MOTOR HAS ON FORCED OSCILLATIONS OF A UNIAXIAL GYROSTABILIZER

MEZHVUZOVSKIY SBORNIK. LENINGRADKIY ELEKTROTEKHNICHESKIY INSTITUT [Inter-institutional Collection. Leningrad Electrical Engineering Institute] in Russian no 117, 1977 pp 92-97

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A57 by the author]

TOKAREV, V. A.

[Text] An examination is made of forced motion of a uniaxial gyrostabilizer under the action of a harmonic and a constant torque with consideration of friction losses in the gearbox of the stabilizing motor. It is shown that friction in the gearbox changes the static and dynamic characteristics of the system.

USSR

UDC 531

ON THE DYNAMICS OF A CONTROLLABLE GYROSTABILIZER WITH ELASTIC COUPLING OF THE SUSPENSION ELEMENTS

MEZHVUZOVSKIY SBORNIK. LENINGRADSKIY ELEKTROTEKHNICHESKIY INSTITUT [Inter-institutional Collection. Leningrad Electrical Engineering Institute] in Russian No 117, 1977 pp 97-103

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A58 by the author]

CHERNOV, V. YU.

[Text] An examination is made of a uniaxial controllable gyrostabilizer design with consideration of the elasticity of elements of the suspension. Differential equations of motion are presented from which an approximate transfer function of an open system is found. An analysis is made of the influence that elastic constraints have on the frequency of nutational oscillations of the gyrostabilizer. Stabilization accuracy is studied with respect to the static characteristics and the transfer functions.

USSR

UDC 531

CONCERNING THE STABILITY OF A GYROSCOPE ON A MOVING BASE IN THE GRAVITATIONAL FIELD OF TWO STATIONARY CENTERS

TEMATICHESKIY SBORNIK NAUCHNYKH TRUDOV. MOSKOVSKIY AVIATSIONNYY INSTITUT [Topical Collection of Scientific Papers. Moscow Aviation Institute] in Russian No 424, 1977 pp 19-23

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A59 (from the article)]

GURIN, A. I.

[Text] Using the Routh and Kelvin theorems, necessary and sufficient conditions are established for the stability of steady-state motions of a gyroscope on a moving base in the force field of two stationary gravitating centers.

USSR

UDC 531

MOTION STABILITY OF A CONTROLLABLE GYROSCOPE IN BANKING

TEMATICHESKIY SBORNIK NAUCHNYKH TRUDOV. MOSKOVSKIY AVIATSIONNYY INSTITUT [Topical Collection of Scientific Papers. Moscow Aviation Institute] in Russian No 424, 1977 pp 24-27

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A60 (from the article)]

LISINA, I. L.

[Text] The Lyapunov method is used to study the stability of motion of a controllable gyroscope in banking in the presence of spring limiters. The angular velocity of banking is assumed to be a predetermined function of time.

USSR

UDC 531

CONCERNING DISPLACING MOMENTS IN MAGNETIC SUSPENSIONS UNDER THE ACTION OF PERTURBING FORCES

MEZHVUZOVSKIY SBORNIK. LENINGRADSKIY ELEKTROTEKHNICHESKIY INSTITUT [Inter-institutional Collection. Leningrad Electrical Engineering Institute] in Russian No 117, 1977 pp 122-124

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A62 by the author]

FEDOROV, V. P.

[Text] An examination is made of the displacing moment that acts on the gyro element of a two-degree floating gyroscope on the side of the magnetic suspension in the case of deviation from the ideal geometric shape of the bearing rotors and action of disturbing forces. It is shown that the displacing moment in this case contains components that depend on linear displacements of the rotors, and consequently differ in instability. Methods are recommended for eliminating the individual components of the displacing moment.

USSR

UDC 531.36;531.31;531.391.5

ENSURING STABILITY OF A GYROSTABILIZER UNDER UNSTEADY WORKING CONDITIONS BY USING A STEADY-STATE CORRECTING LOOP

MEZHVUZOVSKIY SBORNIK. LENINGRADSKIY ELEKTROTEKHNICHESKIY INSTITUT [Inter-institutional Collection. Leningrad Electrical Engineering Institute] in Russian No 117, 1977 pp 103-107

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A69 by the author]

POPOVICHEV, M. V.

[Text] An examination is made of the unsteady mode of operation of a gyrostabilizer with a variable kinetic gyroscope moment. It is shown that it is possible to ensure stability of the system over a broad range of variation in the kinetic moment of the gyroscope by using a steady-state integrodifferentiating correcting loop of second order. Recommendations are made on choosing the parameters of the correcting loop that are confirmed by the results of digital modeling and experimental research. References 5.

USSR

UDC 62-50

AN ALGORITHM FOR SOLVING PROBLEMS IN OPTIMIZING THE KINEMATIC CHARACTERISTICS OF MULTIPLE-RING GYROSCOPE SYSTEMS

MEZHVUZOVSKIY SBORNIK. LENINGRADSKIY ELEKTROTEKHNICHESKIY INSTITUT [Inter-institutional Collection. Leningrad Electrical Engineering Institure] in Russian no 117, 1977 pp 48-53

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A74 by the author]

BYKOVA, G. M.

[Text] An anulysis is made of the particulars of digital computer solution of problems of optimizing the kinematics of gyrosystems with additional degrees of freedom. A numerical algorithm is proposed that appreciably improves convergence of the iteration algorithm by reducing the nonlinear boundary value problem to a Cauchy problem.

USSR

UDC 531.55:521.2

A COMBINED METHOD OF SOLVING THE GUIDANCE PROBLEM IN SPACEFLIGHT MECHANICS

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Space Research in the Ukraine. Republic Interdepartmental Collection] in Russian No 11, 1977 pp 27-30

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A96 by the authors]

GOVORUKHA, M. I. and FEDAN, E. I.

[Text] An examination is made of a combined method of solving the problem of guidance in spaceflight mechanics. The essence of the method consists in using the theory of keplerian motions to determine the initial approximate values of the parameters of orientation of the velocity vector of a space vehicle and derivatives of scattering with subsequent solution of the boundary value problem by a numerical method. This gives the possibility for reducing the time for solution of the problem by a factor of more than two as compared with solution by a purely numerical method.

USSR UDC 531.55:52-.2

ON SOME PARTICULARS OF INVESTIGATION OF A MAGNETIC SYSTEM FOR CONTINUOUS CORRECTION OF A KINETIC MOMENT

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Space Research in the Ukraine. Republic Interdepartmental Collection] in Russian No 11, 1977 pp 78-85

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A97 by the authors]

SHICHANIN, V. N., DRANOVSKIY, V. I., KULIK, A. D. and ALPATOV, A. P.

[Text] An approximate method is presented for studying a magnetic system for continuous correction of the kinetic moment of a flywheel orientation control system. The method is based on differentiating the local, regional and global properties of the processes that take place in the magnetic system for continuous correction. In studying the local properties, a relation is established between the duration of correction and the parameters of the system; channel coupling coefficients are introduced that enable a quantitative evaluation of the influence of cross connections. In studying the regional properties, a method is proposed for determining the conditions of existence of stable periodicity of the corrections in an isolated channel. Cases are pointed out in which global properties can be judged from the result of studying local and regional properties.

The proposed research techniques enable physically graphic optimization of the parameters of the system.

USSR UDC 531.55:521.2

ON THE QUESTION OF SYNTHESIZING AN OPTIMUM SPACECRAFT MOTION CONTROL LAW

Moscow MATEMATICHESKOYE OBESPECHENIYE KOSMICHESKIKH EKSPERIMENTOV [Space Research Software] in Russian 1978 pp 146-148

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A98 by the author]

KUZ'MINYKH, V. A.

[Text] An examination is made of the problem of synthesizing optimum control with limitations on power and orientation of reactive acceleration of a spacecraft. The differential equation for the criterion functional is transformed to parabolic quasilinear form and an estimate is given for the maximum value of the modulus of the criterion functional. References 6.

USSR UDC 531.55:521.2

OPTIMIZING THE SOLUTION OF SOME PROBLEMS IN SPACEFLIGHT CONTROL BY THE METHOD OF DESCENT WITH RESPECT TO A PARAMETER

Moscow MATEMATICHESKOYE OBESPECHENIYE KOSMICHESKIKH EKSPERIMENTOV [Space Research Software] in Russian, 1978 pp 122-141

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A100 by the authors]

LIDOV, M. L. and TESLENKO, N. M.

[Text] It is pointed out that there is an analogy between the problem of choosing the optimum measurement program when there is a limitation on the frequency of measurements, and the problem of linear correction when there is a limitation on the amount of thrust. The problem of choosing the measurement program is generalized to the case of several parameters to be evaluated in the presence of a priori information.

It is proved that the solution of these problems with a controlling function implied by the principle of dynamic programming is absolutely optimum. An algorithm is described for solving these problems by the method of descent

with respect to a parameter, starting from the value of the parameter of the problem for which the solution can be found by an analog of the simplex method.

Results of calculations on choosing an optimum measurement program (with a priori information) are found for a satellite of Mars.

USSR UDC 531.55:521.1

CONCERNING OSCILLATIONS OF A SATELLITE IN AN ELLIPTICAL ORBIT

Kiev PROBLEMY ASIMPTOTICHESKOY TEORII NELINEYNYKH KOLEBANIY [Problems of the Asymptotic Theory of Nonlinear Oscillations] in Russian 1977 pp 46-53

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A104 by the author]

BRYUNO, A. D.

[Text] A nonlinear differential equation that describes planar motion of a satellite relative to a center of inertia that moves in an elliptical orbit is considered for two cases corresponding to oscillations of the satellite either in an orbital or an absolute coordinate system. In these cases, calculations of higher approximations of the asymptotic method are used to refine results on the stability of known periodic solutions, and new classes of stable periodic solutions are found as well. References 13.

USSR UDC 531.55:521.1

STEADY-STATE NATURAL ROTATIONS OF AN ARTIFICIAL SATELLITE IN A MAGNETIC FIELD

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Space Research in the Ukraine. Republic Interdepartmental Collection] in Russian No 11, 1977 pp 17-22

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A107 by the authors]

YANSHIN, A. M. and ZABLUDA, S. M.

[Text] A system of equations is derived that describes the evolution of rotational motion of an artificial satellite in a magnetic field under the effect of the dissipative moment from eddy currents with consideration of the angular rotational velocity of following of the vector or geomagnetic field intensity in an absolute coordinate system along the orbit of the artificial satellite. Based on examples of polar equatorial and steady-state orbits, an investigation is made of the asymptotic steady-state natural rotations of the satellite. It is shown that these steady-state rotations are equal to the angular rotational velocities of following of the vector $\vec{H}$, and as a rule are in a resonant relation with the frequency of orbital revolution of the satellite. Conditions are considered that lead to reversal of satellite rotation by the geomagnetic field. References 12.

USSR

UDC 531.55:521.1

TWO-IMPULSE TRANSFER FROM DIFFERENT POINTS OF AN ELLIPTICAL ORBIT TO A COPLANAR CIRCULAR ORBIT

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Space Research in the Ukraine. Republic Interdepartmental Collection] in Russian No 11, 1977 pp 7-10

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A108 by the author]

KOMAROV, V. G.

[Text] An examination is made of a two-impulse transfer of a space vehicle between a fixed point on an elliptical orbit and a coplanar circular orbit. It is assumed that the impulses are imparted in the direction of the velocity vector. An investigation is made of the way that the characteristic velocity depends on the true anomaly in the elliptical orbit.

USSR

UDC 531.55:521.1

ON CONTROLLING THE MOTION OF A PAIR OF SATELLITES INTENDED FOR PROBING THE MAGNETOSPHERE

Moscow MATEMATICHESKOYE OBESPECHENIYE KOSMICHESKIKH EKSPERIMENTOV [Space Research Software] in Russian 1978 pp 142-145

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A109 by the author]

EYSMONT, N. A.

[Text] An examination is made of problems of optimum control of the motion of a pair of satellites in some neighborhood of a nominal trajectory. Pontryagin's maximum principle is used to solve the problem. A method is proposed for choosing the initial approximation of the solution based on the peculiarities of a given problem.

USSR

UDC 534

DYNAMIC STABILITY OF A GYROSCOPE WITH DISPLACED CENTER OF MASS UNDER CONDITIONS OF RANDOM VIBRATION OF THE BASE

MEZHVUZOVSKIY SBORNIK. LENINGRADKIY ELEKTROTEKHNICHESKIY INSTITUT [Interinstitutional Collection. Leningrad Electrical Engineering Institute] in Russian No 117, 1977 pp 69-72

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A134 by the authors]

GURIN, L. B., KOPYTOV, V. I. and CHAPKOVICH, A. A.

[Text] The authors consider motion of a gyroscope in a Cardan suspension with displacement of the center of mass when the base is subjected to linear vibration that is a wide-band random process. The resultant condition shows that for predetermined gyroscope parameters, the possibility of onset of parametric resonance is influenced by the ratio between damping along the axes of the gyroscope and the spectral density of vibration of the base on a frequency that is double the frequency of nutational oscillations of the gyroscope. Reference 5.

USSR

UDC 534

FREQUENCY BEHAVIOR OF GYROSCOPIC SYSTEMS

MATEMATICHESKIYE METODY I FIZIKO-MEKHANICHESKIYE POLYA. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Mathematical Methods and Physicomechanical Fields. Republic Interdepartmental Collection] in Russian No 7, 1978 pp 20-21

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A144 by the author]

BALINSKIY, A. I.

[Text] The classical result of frequency behavior of linear conservative mechanical systems is extended to gyroscopic systems by reducing the initial eigenvalue problem that is nonlinear with respect to a spectral parameter to an equivalent linear and symmetric problem.

USSR UDC 534

INVESTIGATION OF THE INFLUENCE THAT NONIDENTITY OF CHANNELS HAS ON THE DYNAMICS OF A DIRECT GYROSTABILIZER

MEZHVUZOVSKIY SBORNIK. LENINGRADKIY ELEKTROTEKHNICHESKIY INSTITUT [Inter-institutional Collection. Leningrad Electrical Engineering Institute] in Russian No 117, 1977 pp 146-152

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7A161 by the authors]

VLASOV, YU. V. and SAVIN, N. S.

[Abstract] An investigation is made of the influence that nonidentity of the stiffnesses of the torsion members with respect to the axes of precession of gyroscopes has on the frequency characteristics of a two-axle direct gyrostabilizer. It is theoretically and experimentally shown that when such nonidentity is present, "splitting" occurs between the nutational frequencies and the frequencies on which maximum suppression of forced oscillations of the platform is observed. Expressions are found for the direct and cross coefficients of transfer of the gyrostabilizer as a function of its major parameters.

USSR UDC 533.652/.661.013

SYNTHESIS OF AN OPTIMUM SYSTEM FOR STABILIZING THE TRAJECTORY OF A FLIGHT-CRAFT WITH TWO CONTROL ELEMENTS

Moscow SINTEZ OPTIMAL'NOY SISTEMY STABILIZATSII TRAYEKTORII LETATEL'NOGO APPARATA S DVUMYA UPRAVLYAYUSHCHIMI ORGANAMI in Russian, Moscow Aviation Institute, 1977, 5 pp (deposited in TsNIITEIpriborostr., 16 Jan 78 No 844)

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B1292 DEP by the author]

SOROKIN, A. P.

[Text] The paper deals with problems of constructing a system for stabilizing the motion of a flightcraft controlled by the principle of tracking the parameters of a nominal trajectory. Flightcraft motion is described by a system of unsteady equations. An optimum algorithm is synthesized for coupled control by two control elements. A Riccati matrix

equation is integrated in the reverse direction of change of the independent variable to find the variable coefficients of feedback. A method is developed for finding the elements of weighting matrices of the quality criterion with consideration of given indices of quality of control processes, acting perturbations and limitations on controlling variables. The control algorithm derived as a result of synthesis can be realized by an airborne digital computer.

USSR UDC 629.761.78.015:533.6

SITUATIONAL CONTROL OF A DYNAMIC OBJECT

TEMATICHESKIY SBORNIK NAUCHNYKH TRUDOV. MOSKOVSKIY AVIATSIONNYY INSTITUT [Topical Collection of Scientific Papers. Moscow Aviation Institute] in Russian No 419, 1977 pp 66-70

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B1313 by G. S. Aronin]

OSIPOV, V. G., OSIPOVA, V. A. and FEDULOV, V. V.

[Text] An examination is made of an algorithm for flightcraft motion control realized by an airborne digital computer by changing the angle of attack for tracking longitudinal range and changing the angle of banking for tracking lateral range. It is assumed that thrust is equal to zero, flight takes place in the atmosphere of a spherical non-rotating planet, and control commands are sent at discrete moments of time. For situations in which it is impossible to compensate for mismatch with respect to lateral range without introducing perturbations in the longitudinal range channel it is proposed that one of three fixed controlling actions with respect to banking be selected (zero, positive, negative) such that a minimum specially constructed utility function is realized that accounts for deviations from the nominal trajectory with respect to longitudinal and lateral ranges and other parameters. The weighting coefficients for individual parameters are selected on the basis of expert estimates. References 5.

USSR UDC 621.311.153

GENERALIZATION OF THE RESULTS OF STUDIES OF 300 MW GENERATORS WHEN THE LOAD IS DROPPED COMPLETELY OR TO THE LEVEL OF INTERNAL NEEDS

MANEVRENNOST' MOSHCHNYKH TEPLOENERGETICHESKIKH BLOKOV. TRUDY VSESOYUZNOGO TEPLOTEKHNICHESKOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTE IMENI F. E. DZERZHINSKOGO [Maneuverability of Powerful Thermal Power Units. Proceedings of the All-Union Scientific Research Institute of Heat Engineering imeni F. E. Dzerzhinskiy] in Russian No 14, 1978 pp 132-153

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 9, 1978 Abstract No 9.49.88]

IZRAILEV, YU. L., LIVSHITS, M. A., PLOTKIN, YE. R. and SOZAYEV, A. S.

[Text] The paper generalizes the results of theoretical and experimental research done by the All-Union Scientific Research Institute of Heat Engineering imeni F. E. Dzerzhinskiy, ORGRES, the Central Boiler and Turbine Institute and other organizations. It has been established that no-load or internal-needs conditions can be maintained on 300 MW generators after the load is dropped. Retention of the rated pressure of live steam when the load is dropped is fully admissible with respect to reliability conditions, and therefore the requirement of an obligatory pressure drop to 15.7 MPa (160 kgf/cm^2) can be done away with. References 15.

USSR UDC 533.9

THE HYDRODYNAMIC EFFECT FOR A PLASMA IN A MAGNETIC FIELD

VESTNIK LENINGRADSKOGO GOSUDARSTVENNOGO UNIVERSITETA in Russian No 1, 1978 pp 103-106

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B384 by the author]

KAPITANOV, V. S.

[Text] The method of continuum integration is applied to a system of Fermi particles with Coulomb interaction (a plasma) in a constant magnetic field. Interaction is accounted for by introducing an additional Bose field. An expression is found for the "hydrodynamic action" functional by integration with respect to "fast" Bose fields. A modified perturbation theory is constructed that is free of divergences at low momenta. Hydrodynamic action is used to calculate damping of long-wave plasma oscillations with translogarithmic accuracy for an electron-ion plasma.

USSR UDC 533.9

RADIATION OF A LAYER OF NONEQUILIBRIUM PLASMA

FIZIKA PLAZMY in Russian Vol 4, No 2, 1978 pp 420-432

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B394 by the authors]

ZAGORODNIY, A. G. and YAKIMENKO, I. P.

[Text] Energy relations are established for spontaneous radiation of a layer of plasma that is in a steady, but thermodynamically nonequilibrium state. An investigation is made of the possibility of instability of quasistatic surface excitations and an associated anomalous rise in the effective temperatures of the quasistationary field of spontaneous emission. A numerical analysis is made of the frequency and angular distributions of intensity of spontaneous emission of a layer of nonisothermal electron-ion plasma. It is demonstrated that there are interference resonances associated with collective excitations in the body of the plasma. References 20.

USSR UDC 533.9

INFLUENCE THAT THE POSITION OF THE BOUNDARY OF THE PLASMA OF THE REGION OF NEUTRALIZATION OF AN ION BEAM HAS ON ITS DEFLECTION

FIZIKA PLAZMY in Russian Vol 4, No 2, 1978 pp 371-377

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B400 by the authors]

LIKHTER, V. A. and SHUL'GIN, V. I.

[Text] The paper gives the results of a study of the deflection of an ion beam by transverse displacement of an accelerating electrode for different degrees of deceleration and positions of the plane of neutralization. It is shown that when the plane of neutralization is very far from the accelerating electrode and the degree of deceleration is low the observed deflection of the ion beam agrees well with the results of calculation. At short distances to the plane of neutralization and for high degrees of deceleration appreciable beam deflection takes place beyond the accelerating electrode and in this case the experimental data agree with the results of modeling. Masimum deflection of the ion beam reached 35°.

USSR UDC 533.9

ONSET AND DEVELOPMENT OF IONIZATION TURBULENCE

TRUDY MOSKOVSKOGO ENERGETICHESKOGO INSTITUTA [Scientific Transactions of Moscow Power Engineering Institute] in Russian No 336, 1977 pp 26-32

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B490 by I. M. Rutkevich]

SINKEVICH, O. A. and CHUKLOVA, V. T.

[Text] A system of ordinary differential equations is derived for the amplitudes of interacting perturbations as an ionization instability develops. An examination is made of a nonequilibrium plasma in a flat channel with nonconductive walls, x=const. The electric current flows perpendicularly to the magnetic field directed along the z-axis. The parameter of supercriticality is taken as small, and the Lyapunov-Shmidt method is used to study wave interaction in the transcritical region. It is proposed that the resultant system of equations be used to find the spectrum of ionization turbulence. Figures 7.

USSR UDC 533.95

SPECTRA OF CYCLOTRON WAVES IN A PLASMA CONTAINING TWO KINDS OF IONS

FIZIKA PLAZMY in Russian Vol 4, No 2, 1978 pp 394-398

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B506 by the authors]

KALADZE, T. D. and TSAMALASHVILI, L. V.

[Text] The paper gives the results of a numerical solution of the dispersion equation for ion cyclotron waves propagating perpendicularly to a magnetic field in a plasma containing ions of two kinds (deuterium+tritium) for different values of the ratio of plasma pressure to magnetic field pressure. References 17.

USSR UDC 533.95

SPECTRAL DENSITIES OF SPATIAL CORRELATION OF CHARGE IN A PLANE LAYER OF TWO-TEMPERATURE ELECTRON-ION PLASMA

FIZIKA PLAZMY in Russian Vol 4, No 2, 1978 pp 399-410

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B507 by the authors]

POPOV, V. S. and YAKIMENKO, I. P.

[Text] An examination is made of electromagnetic fluctuations in an electron-ion plasma bounded by two parallel planes on which the condition of mirror reflection of charged particles is satisfied. The boundary value problem is solved for a fluctuation field in such a system, and correlation functions are then constructed for fluctuation deviations of the density of electron and ion charges from the statistically average values. An investigation is made of the special cases of an electron and a nonisothermal electron-ion plasma. Principal emphasis is placed on regions of transparency of the plasma in which fluctuations take on a wave character and the influence of the boundaries becomes appreciable throughout the volume of the plasma. References 25.

USSR UDC 533.95

ON THE ANGULAR ANISOTROPY OF ELECTROMAGNETIC ENERGY FLUX IN THE VICINITY OF A PLASMA RESONANCE

Moscow VOLNOVYYE PROTSESSY V PRIZEMNOM PLAZME [Wave Processes in a Ground Plasma] in Russian 1977 pp 135-140

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B532 by the author]

MOISEYEV, B. S.

[Text] An examination is made of the angular anisotropy of energy flux propagating in a weakly nonhomogeneous medium in the vicinity of a plasma resonance. It is shown that far from resonance where absorption is low, waveguiding along the resonant surface is possible. On the other hand in a small neighborhood where damping along the density gradient is high,

the author considers radiation of a source (such as a plasma instability) whose field is the surface waves in this region. An investigation is made of the mutual orientation of the vectors of phase velocity and energy flux for these waves, and it is shown that under certain conditions an inverse electromagnetic wave may exist close to plasma resonance. References 6.

USSR

UDC 536.24

SPACE RADIATION FROM A CONICAL CAVITY WITH UNSTEADY TEMPERATURE FIELD

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY SBORNIK [Space Research in the Ukraine. Republic Interdepartmental Collection] in Russian No 11, 1977 pp 31-34

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B566 by the authors]

DOROSHKEVICH, V. K. and MOSHNENKO, YU. I.

[Text] An examination is made of the process of heat transfer by radiation from the surface of a cavity formed by a shell with unsteady temperature field. Relations are found for determining the heat transfer from the cavity and the unsteady temperature fields along the shell. The system of equations is solved by a numerical method. The results of the calculation are compared with experimental data.

Nuclear Energy

USSR UDC 533.9

INFLUENCE THAT THE MAGNETIC CONFIGURATION OF A POLOIDAL DIVERTER HAS ON A PLASMA DISCHARGE IN A T-12 TEA-RING TOKAMAK

FIZIKA PLAZMY in Russian Vol 4, No 2, 1978 pp 261-268

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B461 by the authors]

BORTNIKOV, A. V., BREVNOV, N. N., GASS, V., GERASIMOV, S. N. ZHUKOVSKIY, V. G., KUZNETSOV, N. V., PERGAMENT, V. I., KHATCHINSON, D. and KHIMCHENKO, L. N.

[Text] The paper gives the results of an experiment on the T-12 tea-ring tokamak with two poloidal diverters. The purpose of the research was to determine the influence that the magnetic configuration of the poloidal diverter has on the physical parameters of the plasma discharge, magnetohydrodynamic stability and stability with respect to the vertical. It is shown that the configuration of the poloidal diverter has a beneficial effect on plasma parameters, and has practically no influence on the magnetohydrodynamic processes inside the plasma discharge (on the development of perturbations with m = 2 and interruption of current.

USSR UDC 533.9

STRUCTURE OF PERTURBATIONS OF THE MAGNETIC FIELD IN DEVELOPMENT OF UNSTABLE COLLAPSE IN THE TOKAMAK-6 FACILITY

FIZIKA PLAZMY in Russian Vol 4, No 2, 1978 pp 275-296

[From REFERATIVNYY ZHURNAL, MEKHANIKA No 7, 1978 Abstract No 7B462 by the author]

MEREZHKIN, V. G.

[Text] An investigation is made of the structure and dynamics of poloidal field perturbations in development of collapse instability on the tokamak-6 facility. An analysis is made of the behavior of the symmetric and dipole components of the field and the particulars of the structure of helical perturbations in minor and major collapses. It is shown that a decisive role is played by helical perturbations with m = 2 in the initial phase of

development of these collapses. It is observed that the structure of helical perturbations is invariable in minor collapses, and that the restructuring of these perturbations is discrete in nature in major collapses. A relation is found between the symmetric and helical components of perturbations of the poloidal field on the leading edge of the rise in perturbations. Data are given on increments, scales and structure of helical perturbations, the relations between the symmetric and helical components of field perturbations, and the magnitude of energy losses of plasma in typical collapses. References 8.

Turbine and Engine Design

USSR UDC 629.7.036.03

ELECTRONIC SIMULATION OF STARTUP OF A TURBOJET AIRCRAFT ENGINE WITH ELASTICITY OF THE COMPONENTS TAKEN INTO ACCOUNT

Moscow VOPROSY TEORII I RASCHETA RABOCHIKH PROTESSOV TEPLOVYKH DWIGATELEY

[Problems in Theory and Design of Working Processes for Heat Engines] in Russian, No 1, 1977 pp 153-156

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.66]

MANZIY, V. S. and PANCHISHIN, V. I.

[Text] A system of computer equations is set up which correspond to earlier derived differential equations describing the startup of a turbojet engine and which take into account the elasticity of the transmission components. A schematic block diagram of this electronic model is constructed with elements of an MN-14 nonlinear analog computer. Figures 2; references 3.

USSR UDC 621.438.001.5

TEST RESULTS PERTAINING TO A SINGLE-STAGE AIR TURBINE DURING BRAKING

Moscow VYSOKOTEMPERATURNYYE OKHLAZHDAYEMYYE GAZOVYYE TURBINY DVIGATELEY LETATEL'NYKH APPARATOV [Cooled High-Temperature Gas Turbines for Aircraft Engines] in Russian, No 2, 1977 pp 89-96

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.46]

VAVILOV, G. A., KAZAKOV, V. B., MAKSUTOVA, M. K. and TKACHENKO, N. S.

[Text] Test results are presented pertaining to a single-stage air turbine during braking. The working process in the flow channel was examined during braking at various rates of air flow through the turbine. Recommendations are made on how to determine the braking torque developed by a turbine during reverse rotation of the runner. Figures 5; references 3.

USSR UDC 621.438-181.4+629.7.036-181.4

AVERAGING A NONUNIFORM FLOW IN GAS TURBINES AND NOZZLES

Moscow VYSOKOTEMPERATURNYYE OKHLAZHDAYEMYYE GAZOVYYE TURBINY DVIGATELEY LETATEL'NYKH APPARATOV [Cooled High-Temperature Gas Turbines for Aircraft Engines] in Russian, No 2, 1977 pp 58-67

NATALEVICH, A. S.

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.45]

[Text] A method is considered of averaging a nonuniform flow under a constant static pressure and at a constant stagnation temperature, as through the exit sections of turbine and nozzle arrays. Unlike in the well known method according to L. I. Sedov, where the average flow is regarded as equivalent to a given nonuniform flow on the basis of three parameters only, here the condition T*=const is assumed and two average flows are constructed which together ensure equivalence to a given nonuniform flow also with respect to two additional parameters. References 8.

USSR UDC 621.438:536.24

INVESTIGATION OF THE TOLERANCE LIMITS ON THE DIMENSIONS OF INTERNAL PASSAGES DESIGNED FOR JET COOLING OF A MODEL SIMULATING THE INLET EDGE OF A DEFLECTOR VANE

Moscow TRUDY VTOROY NAUCHNO-TEKHNICHESKOY KONFERENTSII MOLODYKH UCHENYKH I SPETSIALISTOV [Proceedings of the Second Scientific and Technical Conference of Young Scientists and Specialists] in Russian, Moscow Aviation Technological Institute, 1978 pp 245-254 (manuscript deposited in the State Scientific Research Institute of Scientific and Technical Information 12 Jun 78, No 6-78)

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.47 DEP]

GALKIN, M. N., BOYKO, A. N., KHARIN, A. A. and SHEVCHENKO, I. V.

[Text] The study was made by an adapted method of local calorimetry, with the cooled model inside a liquid-metal thermostat. It has been found that, at certain combinations of wall-to-deflector clearance and diameter of deflector holes, the tolerances on the passage dimensions can be widened without

a loss in cooling effectiveness. Deviation tolerances have been tabulated for various combinations of nominal dimensions so that the latter can be optimized not only with respect to maximum cooling effectiveness but also from the standpoint of manufacturability of the cooling system structure.

USSR UDC 629.7.036.3-711

DEVELOPMENT OF A METHOD OF ESTABLISHING THE TOLERANCES ON THE DIMENSIONS OF INTERNAL PASSAGES BETWEEN TURBINE BLADES

Moscow TRUDY VTOROY NAUCHNO-TEKHNICHESKOY KONFERENTSII MOLODYKH UCHENYKH I SPECIALISTOV [Proceedings of the Second Scientific and Technical Conference of Young Scientists and Specialists] in Russian, Moscow Aviation Technological Institute, 1978 pp 238-244 (manuscript deposited in the State Scientific Research Institute of Scientific and Technical Information 12 Jun 78, No 6-78)

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.48 DEP]

GALKIN, M. N., BOYKO, A. N. and KHARIN, A. A.

[Text] The gist of the proposed method is as follows. The effect of a design dimension d_i characterizing a blade cooling system on the local coefficients α_A of heat transfer to air is determined, in terms of an influence function, at a given operating drop of air pressure π along a blade by local calorimetry inside a liquid-metal thermostat Then the range of permissible deviations $\Delta\alpha_A$ of the heat transfer coefficients due to variations in the design dimension d_i is determined from the deviation of wall temperature ΔT_w . The tolerance limits on the particular design dimension d_i are now defined to correspond to the given range of α_A variations on the basis of the influence function $\alpha_A = f(di\pi)$. A graphical version of this method is also proposed and theoretical relations are derived for processing the results of original measurements.

USSR

UDC 629.7.03:621.438

CALCULATION OF THE TEMPERATURE FIELD OF SOLID BLADES IN A TURBINE UNDER STEADY CONDITIONS WITH PARTIAL COOLING AT THEIR ROOTS

Moscow VYSOKOTEMPERATURNYYE OKHLAZHDAYEMYYE GAZOVYYE TURBINY DVIGATELEY LETATEL'NYKH APPARATOV [Cooled High-Temperature Gas Turbines for Aircraft Engines] in Russian, No 2, 1978 pp 12-18

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.38]

LOKAY, V. I., TKACHENKO, N. S. and ABDRAKHMANOV, SH.SH.

[Text] A system is described for partial cooling of active turbine blades at their roots. Methods of calculating the temperature field of a solid turbine blade with such cooling are shown and results of these calculations are presented. Figures 5; references 2.

USSR

UDC 621.438:536.24

GENERALIZATION OF TEST DATA ON HEAT TRANSFER IN WORKING RUNNERS OF RADIAL-AXIAL TURBINES

Moscow VYSOKOTEMPERATURNYYE OKHLAZHDAYEMYYE GAZOVYYE TURBINY DVIGATELEY LETATEL'NYKH APPARATOV [Cooled High-Temperature Gas Turbines fir Aircraft Engines] in Russian, No 2, 1977 pp 36-43

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.37]

BODUNOV, M. N., CHUGUNOV, YU. N. and FAKHRUTDINOV, R. D.

[Text] Body forces are examined which act on a gas stream in the rotating intervane passages of radial-axial turbine runners. By analysis of the equations of steady-state motion and in accordance with scaling theory, additional dimensionless numbers are obtained representing the effect of centrifugal, lift and Coriolis body forces on the heat transfer. Figures 1; references 14.

USSR UDC 621.438

OPTIMUM PARAMETERS OF THE RUNNER IN A RADIAL-AXIAL TURBINE STAGE

TRUDY NIKOLAYEVSKOGO KORABLESTROITEL'NOGO INSTITUTA IMENI AKADEMIKA S. O. MAKAROVA [Proceedings of Nikolayev Shipbuilding Institute imeni Academician S. O. Makarov] in Russian Nð 132, 1978 pp 52-57

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 9, 1978 Abstract No 9.49.21]

LEVENBERG, V. D. and BORISENKO, V. D.

[Text] The article gives the results of solution of the problem of optimizing the geometric parameters that determine the shape of the flow section of the runner in a radial-axial centripetal turbine, and analyze the flow of a three-dimensional stream in a stage of optimum geometry. Figures 5, references 4.

USSR UDC 621.438+621.165:536.2

ON THE PROBLEM OF CHOOSING THE PARAMETERS OF A MARINE STEAM-GAS TURBINE POWER PLANT WITH INTERMEDIATE GAS HEATING

TRUDY NIKOLAYEVSKOGO KORABLESTROITEL'NOGO INSTITUTA IMENI AKADEMIKA S. O. MAKAROVA [Proceedings of Nikolayev Shipbuilding Institute imeni Academician S. O. Makarov] in Russian No 132, 1978 pp 15-19

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE, No 9, 1978 Abstract No 9.49.15]

VASHCHILENKO, N. V. and GENBOM, V. A.

[Text] The paper gives the results of a thermodynamic analysis of a marine steam-gas power plant with intermediate gas heating. The authors justify the feasibility of locating the combustion chamber for intermediate gas heating between the gas generator and the turbine screw of the gas-turbine engine. Recommendations are made on choosing the main parameters of the cycle of the installation. Figures 4, table 1.

EQUIPMENT
Industrial

USSR

UDC 531.787

AN INSTALLATION WITH A HIGH-SPEED VALVE FOR REPRODUCTION OF PRESSURE PULSES IN A FLUID

TRUDY METROLOGICHESKIHK INSTITUTOV SSSR. VSESOYUZNYY NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGICHESKOY SLUZHBY [Proceedings of Metrological Institutes of the USSR. All-Union Scientific Research Institute of the Metrological Service] in Russian 1978 No 223/283 pp 70-79

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.681]

DUNAYEVA, V. A. and PLOTNIKOV, I. V.

[Text] A description and results of experimental testing are presented for an installation containing a high-speed valve, which can reproduce pressure steps in a fluid of from 15^5 to 6.10^7 Pa with a rise time to the peak pressure of 0.3 ms and a duration of settling of the transient pressure of 7-10 ms. An estimate is presented of the error in reproduction of pressure. Figures 2.

Measuring, Testing

USSR

UDC 621.383

MEASURING DEVICES FOR THE STUDY OF THE CONVERSION FACTOR OF PHOTOELECTRIC MEASURING CONVERTERS AND THE LINEARITY OF THE CONVERSION CHARACTERISTIC IN THE DYNAMIC OPERATING MODE

IMPUL'S NAYA FOTOMETRIYA [Pulse Photometry] in Russian 1978, No 5, pp 99-102

[From REFERATIVNYY ZHURNAL METROLOGIYA I IZMERITEL'NAYA No 9, 1978, Abstract No 9.32.1473]

CHERNOYARSKIYY, A. A. and YAKOVLEV, V. A.

[Text] Measuring installations have been developed for metrologic study of photoelectric measuring transducers in the pulse mode of operation in the spectral range of 0.5-1.6 μm. Figures 2, References 3.

USSR

681.787.6:621.375.826

MULTIPLE-BEAM SCANNING FABRY-PEROT INTERFEROMETERS WITH VARIABLE BASE

TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNYY NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGII [Proceedings of Metrological Institutes of the USSR. All-Union Scientific Research Institute of Metrology] in Russian No 220/280, 1977 pp 26-32

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.1397]

BOBRIK, V. I., KOLINKO, N. B., MZHEL'SKIY, A. A. and SADOVSKAYA, E. N.

[Text] A report is presented on the development and study of two scanning Fabry-Periot interferometers with variable base, used to measure laser wave lengths. In one design, one of the mirrors is moved with respect to the other on a guide. The maximum possible movement is 100 mm. In the other design, quartz dividers are installed between the mirrors, allowing the distance to be varied from 1 to 300 mm. Figures 4, References 6.

USSR

UDC 621.383.52

PROBLEMS OF EVALUATING THE OPERATION OF PULSED MATRIX PHOTOSENSORS

IMPUL'S NAYA FOTOMETRIYA [Pulse Photometry] in Russian 1978, No 5, pp 173-175

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.1345]

BUZANOVA, L. K., GLIBERMAN A. YA., GRACHEVA, N. M., MOLODYK, A. M. and YAKOVLEV, I. M.

[Text] The basic parameters and characteristics of several types of silicon pulsed matrix photosensors with high sensitivity in the shortwave area of the spectrum at 0.4-0.6 μm are studied. The photosensors allow a reverse bias of up to 100 V and have low values of RC parameters. Figures 2, References 4.

USSR

UDC 681.7.069.3

A PYROELECTRIC PULSE RADIATION RECEIVER BASED ON A COMMERCIAL PIEZOCERAMIC

IMPUL'S NAYA FOTOMETRIYA [Pulse Photometry] in Russian 1978, No 5, pp 110-113

[From REFERATIVNYY ZHURNAL METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.1343]

GUZHVA, V. G. and KUZ'MICHEV, V. M.

[Text] Information is presented on the design and characteristics of a pyroelectric radiation receiver, suitable for detection of pulses of radiation in the optical, infrared and submillimeter wafe length bands. The transmitted band width of the matching stage is 50 MH_z, the sensitivity of the receiver is 5 $V.MW^{-1}$ with an electric time constant of 5 ns. Figures 2, References 2.

USSR UDC 681.7.069.3

A PYROELECTRIC PULSE RADIATION RECEIVER BASED ON A COMMERCIAL PIEZOCERAMIC

IMPUL'S NAYA FOTOMETRIYA [Pulse Photometry] in Russian 1978, No 5, pp 110-113

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.1343]

GUZHVA, V. G. and KUZ'MICHEV, V. M.

[Text] Information is presented on the design and characteristics of a pyroelectric radiation receiver, suitable for detection of pulses of radiation in the optical, infrared and submillimeter wave length bands. The transmitted band width of the matching stage is 50 MH_z, the sensitivity of the receiver is 5 $V.MW^{-1}$ with an electric time constant of 5 ns. Figures 2, References 2.

USSR UDC 681.7.069.225

A HIGH-POWER PHOTOLYTIC SOURCE OF ULTRAVIOLET RADIATION IN THE MICROSECOND RANGE

IMPUL'S NAYA FOTOMETRIYA [Pulse Photometry] in Russian 1978, No 5, pp 169-172

[From REFERATIVNYY, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.1330]

BELOGOLOVTSEV., G. I. and LYANNOY, N. N.

[Text] A light source for flash photolysis, based on a z-pinch, is described. Its basic parameters are: length of light pulse 2.5 μs; energy radiated in a pulse in the 230-400 nm wave length band - 250 J; the lamp is filled with argon at 130 N/m^2; the operating voltage is 30 kV. The radiated energy is measured with an IMO-w calorimeter. Figures 2, References 6.

USSR 621.383.537.533.8

MILLISECOND AND MICROSECOND DURATION FLASH COMPARISON

IMPUL'S NAYA FOTOMETRIYA [Pulse Photometry] in Russian 1978, No 5, pp 161-164

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKNIKA No 9, 1978, Abstract No 9.32.1328]

NOVIKOVA, G. M., IGNAT'YEV, V. G. and KHAUSTOVA, V. P.

[Text] The GSSI-1 and GSSI-2 stable light flash generators have been developed to be used with flash photometers. The ratiation sources in the generators are IFK-150 and IPO-75 flash lamps. The light flashes produced are 4.5 ms, 200 and 20 μs in length, trapezoidal in shape. Table 1, Figures 2, References 5.

USSR UDC 681.784.4.089.6

INSTALLATION FOR DEPARTMENTAL TESTING OF FLASH PHOTOMETERS AND ITS PHOTOSENSING DEVICE

IMPUL'S NAYA FOTOMETRIYA [Pulse Photometry] in Russian 1978, No 5, pp 67-72

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.1315]

IGNAT'YEV, V. G., GONCHUKOVA, N. I., NOVIKOVA, G. M., TROFIMOVA, G. V. and IL'CHENKO, O. V.

[Text] The installation includes light-measuring incandescent lamps, flash comparison sources, a photosensing device and recording instruments. Adjustment of the photosensing device, constructed on the basis of the ISP-51 spectrograph, is performed by means of a spectral mask, which includes a fiber-optics collector. The installation can be used to check photometers with primary error of over 10%. Table 1, Figures 2, References 2.

USSR UDC 681.2:531.756

DEVELOPMENT AND INTRODUCTION OF THE PR-1024 and PR-1025 GAMMA-ABSORPTION DENSITOMETERS

Kiev RADIOIZOTOPN NAYA TEKHN IKA [Radioisotope Equipment] in Russian, 1977, pp 88-90

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKNIKA No 9, 1978, Abstract No 9.32.1181]

BETIN, YU. P., BERKHOVSKIY, V. I. and KOTIK, U. I.

[Text] The PR-1024 instrument is produced in two versions, the normal and explosion-safe models. Both models are designed to test the density of solutions and slurries with densities of up to 3.0 g/cm^3 in pipes from 100 to 300 mm in diameter. The PR-1025 is designed both for testing of the density of solutions and slurries, and for combined operation with other instruments (conductometers, flow-rate meters, concentration meters and analyzers) to test the content of solid phase in slurries, to check the composition of binary, trinary and more complex products used in non-ferrous and ferrous metallurgy processing, in the chemical industry and other branches of industry.

USSR UDC 539 89

APPARATUS FOR STUDY OF MATERIALS IN A BROAD RANGE OF GAS PRESSURES UP TO 30 KBAR AT TEMPERATURES UP TO 2000°C

Tallin FIZ, ICHESKIYE ISSLED OVANIYA PRI VYSOK IKH DAVLENIYAKH [Physical Research at High Pressures] in Russian Part 1, 1977, pp 22-33

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.1153]

BONDARENKO, M. D.

[Text] A universal apparatus has been developed for the study of phase transitions by thermal analysis and the method of conductivity, for the synthesis of new materials, as well as the study of melting, the electrical, physical-mechanical and other properties of materials over a broad range of gas pressures of up to 30 kbar at temperatures from room temperature to

2000°C. The apparatus consists of a two-stage gas-pressure source, a test chamber, a pressure multiplier with a delivery chamber and a control panel. The first stage of the pressure source is a diaphragm-type separator which compresses the gas to 2 kbar. In the second stage, a multiple-pass multiplier, the gas is further compressed to 14 kbar. In the third stage, the gas is compressed further by a multiplier to the final assigned pressure, at the assigned test temperature. The test chamber is equipped with a set of cells for various types of investigations. Figures 9, References 15.

USSR

UDC 551.508.7

NEUTRON TESTING OF THE MOISTURE CONTENT OF ABESTOS-CEMENT PIPES

IZOTOPY V SSSR. NAUCH NO-TEKHN ICHESKIY I PROIZV ODSTVENNYY S BORNIK [Isotopes in the USSR. Scientific-Technical and Production Collection] in Russian 1978, 51, pp 27-31

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.1143]

KATSMAN, YU. A., KUCHER, SH. A., PEKARSKIY, G. SH. and CHISLOV, N. N.

[Text] The use of ordinary moisture-content meters to test the moisture content of asbestos-cement pipe is difficult for several reasons. Based on studies performed, a laboratory model moisture meter is developed in the range of moisture contents of 10-30%, with an error of $\pm$ 1% and a measurement time of 15-20 s. Figures 4, References 3.

USSR UDC 543.426

THE USE OF A TARGET CONVERTER TO SEPARATE THE ANALYTIC LINE FROM THE SECONDARY SPECTRUM DURING X-RAY RADIOMETRIC FLUORESCENT ANALYSIS

APPARATURA I METODY TENTGENOVSKOGO ANALIZA [Equipment and Methods of X-Ray Analysis] in Russian

[From REFERATIVNYY ZHURNAL METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.1097]

BETIN, YU. P., VERKHOVSKIY, B. I., ZHABIN, YE. G. and KRAMPIT, I. A.

[Text] The influence that the surface density of a converter target and the primary radiation energy have on the signal/noise ratio is studied for the process of X-ray radiometric fluorescent analysis with radio isotope excitation. Results are presented from an experimental check of the theoretical assumptions used in separation of the lines of Ni $K\alpha\beta$ (against the background of Fe $K\alpha\beta$) and Pb $L\alpha\beta$ (against the background of Zn $K\alpha\beta$) using ^{109}Cd as a source and a type SI-6R proportional counter. It is shown that the effectiveness of recording of secondary radiation varies with elements with different values of Z when excited by ^{109}Cd for iron and zinc converter targets. Figures 5, References 9.

USSR 535.853.22

THE HIGH-RESOLUTION INFRARED MEASUREMENT SYSTEM OF THE INSTITUTE OF SPECTROSCOPY, USSR ACADEMY OF SCIENCES

Moscow MATERIALY SOVETSKO-FRANTSUZSKOGO SIMPOSIUMA PO OPTIKOSPEKTRAL'NYM PRIBORAM I PRIBORAM DLYA OBRABOTKI IZOBRAZHENIY, MOSKVA, SENT., 1976 [Materials of Soviet-French Symposium on Optical-Spectral Instruments and Instruments for Image Processing, Moscow, September, 1976 in Russian 1977, pp 8-11]

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA in Russian, No 9, 1978, Abstract No 9.32.1076]

BOGDANSKIS, N. I., BUKREYEV, V. S. and ZHIZHIN, G. N.

[Text] The Institute of Spectroscopy, Academy of Sciences, USSR is in the process of creating a spectral measurement system for the IR band, wave

lengths 0.7-100 μm, with a resolution of 0.01 cm^{-1}. This measurement system is intended for the study of the fine structure of the vibrational and rotational bands of absorption of molecules of the gas phase and electron spectra of extrinsic crystals at low temperatures. Reference 1.

USSR UDC 621.398

THE UVTS-30)MULTICHANNEL DEVICE FOR COLLECTION, PROCESSING AND RECORDING OF STANDARDIZED ANALOG SIGNALS

TRUDY SOYUZNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA PRIBOROSTROYENIYA [Proceedings of the Union Scientific Research Institute of Instrument Making] in Russian 1978, No 36, pp 103-108

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9,32.84]

VOROB'YEV, D. M., GUDKOV, V. I., DUMA, V. R., LEVIN, G. L. and FILATOV, V. P.

[Text] The UVTS-30 device can receive 256 analog signals in the $\pm$ 5 V range, measure them, convert and record them in digital form. The program under which the device functions is recorded in a read-only memory and can be changed, depending on the task to be performed. The UVTS-30 can be used as a part of multichannel measurement systems (VRK, KGO, KRB, etc.).

USSR UDC 543.544

A CHROMATOGRAPH FOR ANALYSIS OF LOWER FATTY ACIDS CONTAINED IN SILAGE AND HAY FEED

NAUCHYYE PRIBORY in Russian 1978, No 15, pp 3-10

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.1058]

BRAZHNIKOV, V. V., SAPUNOV, YU. A., POZHARSKIY, V. K., KURTSMAN, M. A., ROMANOV, V. I. and BARANOV, P. YA.

[Text] A laboratory chromatograph is developed, intended for automated analysis of lower fatty acids in silage and hay feeds; this is one of the first chromatographic instruments which is specially designed for agriculture. For the first time in Soviet gas chromatographs, a device is included for automatic injection of liquid specimens. Figures 5, Tables 2, References 6.

USSR UDC 531.789.1:681.26

A NON-CONTACT TORQUE TRANSDUCERS WITH FREQUENCY OUTPUT

Moscow SOVREMENNYYE PROBLEMY RAZVITIYA ISPYTATEL'NYKH MASHIN, VESODOZIROVOCHNOY I SILOIZMERITEL'NOY TEKHNIKI [Current Problems of the Development of Testing, Weighing and Force-Measuring Equipment] in Russian 1978 pp 145-149

[From REFERATIVNYY ZHURNAL METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 9, 1978, Abstract No 9.32.516]

YERUSLANOVA, O. M., PARFENOV, M. M., PLISKIN, YU. S. and RYTOV, YE. N.

[Text] A study is made of possible versions of noncontact transmission of signals during measurement of torque, and a design is suggested by the authors for transformer-type current taps which, in contrast to known models, allows the achievement of good electrical characteristics with a comparatively simple configuration of the transducer with air gaps between the moving and nonmoving parts of the U-shaped magnetic circuit on the order of 1.5-2 mm, significantly simplifying the manufacture of the component parts and assembly of the entire transducer. Figures 3, References 3.

USSR

UDC 531.781.087.92

BASIC MODELS OF STRAIN-GAGE FORCE SENSORS FOR THE CONSTRUCTION OF STRUCTURALLY STANDARDIZED PARAMETRIC SERIES

Moscow SOVREMENNYYE PROBLEMY RAZVITIYA ISPYTATEL'NYKH MASHIN, VESODOZIROVOCHNOY I SILOIZMERITEL'NOY TEKHNIKI, [Current Problems of the Development of Testing, Weighing and Force-Measuring Equipment] in Russian 1978, pp 96-102

[From REFERATIVNYY ZHURNAL METROLOGIYA I IZMERITEL'NAYA TEKHNIKA, No 9, 1978, Abstract No 9.32.471]

GODZIKOVSKIY, V. A., LIFANOV, I. I., SANTO, V. R. and SHKVARIKOV, YE. V.

[Text] Strain-gage force sensors have been developed and are being put in series production. The characteristics of these sensors satisfy the requirements placed on basic models intended for construction of structurally standardized series for nominal loads of 200-200,000 kgf in combined systems. Figures 2, Table 1, References 4.

Non-Nuclear Energy

USSR UDC 629.7.035.3

FEASIBILITY OF USING AN AI-20 TURBOPROP ENGINE AS A HEAT GENERATOR

Moscow VOPROSY TEORII I RASCHETA RABOCHIKH PROTSESSOV TEPLOVYKH DVIGATELEY [Problems in Theory and Design of Working Processes for Heat Engines] in Russian, No 1, 1977 pp 133-136

[From REFERATIVNYY ZHURNAL 34. AVIATSIONNYYE I RAKETNYYE DVIGATELI, No 9, Sep 78 Abstract No 9.34.69]

TALANTOV, A. V., DYATLOV, I. N., KRAVTSOV, YA. I., BULAVKIN, A. A., SHUKIN, V. A., MINGAZOV, B. G. and ICHANKIN, G. S.

[Text] Under consideration are problems in using an AI-20 turboprop engine, after its flight capability has been exhausted, as a heat generating plant. Adjustments in the automatic control system are shown required for operating such an engine without the propeller as a heat generator. Problems of increasing the heat output of such a plant by installing an afterburner chamber are also discussed. Experimental data are presented pertaining to cutoff and completion characteristics of a model afterburner chamber. Figures 2; references 1.

USSR UDC 621.438:622.691.5:621.51(088.825)

A UNIT FOR TRANSFER PUMPING NATURAL GAS

USSR Author's Certificate No 565120, filed 11 Nov 73, published 10 Aug 77

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 9, 1978 Abstract No 9.49.135 P]

KUZNETSOV, YE. F., SUDAREV, A. V. and SHAKHNOVICH, I. YE.

[Text] A unit is proposed for pumping natural gas that contains a gas blower with gas takeoff line, a gas-turbine blower drive with combustion chamber, and a lubricating system with heat exchanger for cooling the oil. As a distinguishing feature of the patent, efficiency is improved and provisions are made for self-contained operation on natural gas. A Ranque-effect swirler is connected in the gas takeoff line with the cold pipe connected to the heat exchanger and the hot pipe connected to the combustion chamber. Figure 1.

Turbine and Engine Design

USSR UDC 621.165-531(088.825)

A HYDRAULIC STEAM-TURBINE REGULATION SYSTEM

USSR Author's Certificate No 568729, filed 26 Jul 74, published 15 Dec 77

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 9, 1978 Abstract No 9.49.92 P]

LYSKO, V. V., LEZMAN, V. I., BEL'FERMAN, M. D. and VOLYNSKIY, M. M., All-Union Scientific Research Institute of Heat Engineering

[Text] A hydraulic system for steam turbine regulation is proposed that contains an rpm sensor coupled through an amplifier and a regulator to a slide valve that is connected to the working cavity of a one-way servomotor. The system also contains a control mechanism. As a distinguishing feature of the patent, the reliability of the system is improved by connecting a two-diaphragm valve to the working cavity of the servomotor. The controlled cavity of this valve is connected to one end cavity of the slide valve, while the cavity between the diaphragms is connected through the control mechanism to the other end cavity of the slide valve. Figure 1.

USSR UDC 621.165-531.8(088.825)

A PRESSURE REGULATOR

USSR Author's Certificate No 581315, filed 28 Jun 76, published 15 Dec 77

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 9, 1978 Abstract No 9.49.108 P]

LYSKO, V. V., LEZMAN, V. I. and BEL'FERMAN, M. D., All-Union Scientific Research Institute of Heat Engineering, Khar'kov Affiliate of the Central Design Office of Glavenergoremont, Ministry of Power of the USSR

[Text] A pressure regulator is proposed for steam-turbine regulating systems. The regulator contains an impulse-fluid feed pipe with output apertures and a flexible plate located on the end face. One end of the plate is fastened to the housing, and the other end is secured to a diaphragm with its cavity connected to the cavity of the medium to be regulated. As a distinguishing feature of the patent, operating characteristics are improved by reducing the influence that changes in the pressure of the impulse fluid have on the position of the plate. The feed pipe has a dead end, and the output apertures are located on the side walls of

the pipe symmetrically with its axis, while the plate has projections that cover these apertures. To prevent the plate from brushing against the feed pipe and to improve reliability, the inside surfaces of the projections are equipped with recesses located opposite the output apertures of the feed pipe and having different surface areas. Figures 3.

USSR UDC 621.165-531.9(088.823)

A STEAM-TURBINE POWER REGULATOR

USSR Author's Certificate No 579680, filed 4 Feb 75, published 25 Nov 77

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 9, 1978 Abstract No 9.49.107 P]

BASHNIN, O. I. and BUYEVICH, V. V.

[Text] A steam-turbine power regulator is proposed that contains a power setter connected to the inputs of a limiter module and a power module that is connected to an output adder; an rpm module with output connected together with the output of an integrator to the inputs of an auxiliary adder with its output connected to the integrator input; a minimum signal selector and a mixing module with mixing signal source. To improve the accuracy and reliability of the regulator, the selector inputs are connected to the outputs of the mixing module and output adder, the output of the selector is connected to an auxiliary integrator input, and the integrator output is connected to the inputs of the power module and the output adder, while the output of the limiter module is connected to the input of the mixing module. Figure 1.

CSO: 1861 - END -